APPENDIX B

Geotechnical Recommendations Memorandum

URS

Alviso Storm Pump Station Project
Initial Study/Mitigated Negative Declaration

City of San Jose

URS

Memorandum

100 W. San Fernando Street, Suite 200
San Jose, CA 95113
(408) 297-9585

Date: November 25, 2014

To: Michael McCullough
Public Works – Storm Section
City of San Jose

Cc: Andre G. Jadkowski, P.E
AN West, Inc.

From: Madhu Thummaluru, G.E.; Paul Boddie, G.E.

Subject: Generator Building Geotechnical Recommendations
Alviso Storm Pump Station Project
San Jose, CA

Generator Building Description

The 65% drawings prepared by AN West, Inc. indicate the generator building will be approximately 31 feet long and 27 feet wide. Retaining walls supporting differential fill heights of 4 to 5 feet are planned around the perimeter of the building; these walls also will also support the exterior CMU block wall and roof loads. A metal stud wall will divide the Engine – Generator Room from the Electrical Room. Finished grade of the concrete slab-on-grade floor is planned at about Elevation 7 feet with the generator to be positioned at about Elevation 8 feet. A transformer pad and above-ground fuel tank will be positioned to the north and southeast, respectively, of the Generator Building. Both will be supported on concrete foundations. Other than the weight of the new fill, structural loads are expected to be relatively light.

Subsurface Field Exploration

Exploratory Boring APS_B03 was drilled within the generator building footprint to a depth of 36½ feet. Ten other borings (APS_B01, APS_B02 and APS_B04 through APS_B11) were drilled to depths ranging from 26½ to 76½ feet to obtain the subsurface information for the other project components. One groundwater monitoring well was installed in the pump station wet well footprint and three others were installed along the force main alignment. Figure 1 presents the locations of the borings and monitoring wells with respect to the generator building layout and force main alignment.

Subsurface Soil Conditions

Borings completed in the parking lot encountered a thin pavement section consisting of about 1-inch of asphalt concrete underlain by fill soils extending to depths of 2 to 6½ feet below ground surface (bgs). The fill soils consisted of silty sand with gravel, silty gravel and fat clay with gravel. To the best of our knowledge, no records are available to document when the existing fill was placed or the compactive effort applied.

The native soils encountered beneath the generator building footprint generally consist of medium stiff to stiff fat clay to a depth of 8½ feet underlain by stiff to very stiff lean clay and sandy lean clay to a depth of 19½ feet. Below a depth of about 19½ feet, is a layer of medium stiff sandy, silty clay with silty sand interbeds to terminal depth of 36½ feet. No soft Bay Mud was encountered. Comprehensive descriptions of the soils encountered in Boring APS_B03 are presented Figure 2.

Groundwater Conditions

After the completion of Boring APS_B03 on October 30, 2014, groundwater was recorded at a depth of 11 feet bgs (Elevation -9 feet). Groundwater also was measured at a depth of about 7 to 8 feet (Elevation -6 to -7 feet) in monitoring well APS_W01 installed at the pump station site on November 10, 2014. As noted in our technical memorandum for the Pump Station and Wet Well, seasonal fluctuations in the groundwater level are anticipated throughout the year. And we understand that the 100-year flood level in the Alviso area is estimated to reach Elevation 7.3 feet ("Alviso Pump Station Alternative Schematic Design Report" by A-N West, Inc. and MTH Engineers, Inc., dated April 30, 2014).

Recommendations

Bearing Capacity

Considering the soil and groundwater conditions encountered, we believe the generator building can be supported on strip footing foundations bearing on well compacted engineered fill used to replace the existing undocumented fill. Except for the fat clay, the majority of the fill soils are expected to be reusable.

The footings should be embedded at least 18 inches below the lowest adjacent grade. Spread footings extending to this depth and bearing on a minimum uniform section of 24 inches of well compacted, non-expansive engineered fill should be designed using the following bearing pressures:

- Dead load 2,000 psf
- Dead plus live load 3,000 psf
- All Loads 4,000 psf

These design pressure assume minimal disturbance of the subgrade will occur during construction and that all engineered fill will be compacted to a minimum relative compaction of 95 percent, in accordance with ASTM Test Designation D 1557. Overburden pressure should not be added to the bearing pressures listed above. The engineered fill section beneath the footings should extend to a minimum distance of 5 feet horizontally beyond the edge of the footings and beneath the transformer and generator foundations.

Footings located near utilities should extend below an imaginary plane inclined at 1 horizontal to 1 vertical, sloping up from the bottom edge of the utility trench. If the bottom of the footing intersects the imaginary place, the spread footing should be deepened.

Estimated Settlement

As mentioned above, no soft Bay Mud was encountered in the borings drilled in the vicinity of the Generator Building or Pump Station/Wet Well. Nonetheless, settlement is likely to occur due to the new fill and structural loads. Settlement estimates will be provided when the laboratory consolidation tests results are available.

Design Earth Pressures under Static Loading Conditions

Below grade walls that are free to deflect at the top in response to lateral loads should be designed for active earth pressures. Lateral earth pressure will be greater than active and approach at-rest conditions where walls are restrained from moving.

If relatively clean, compacted granular materials, such as an aggregate subbase with a minimum R-value of 40 are used as backfill for perimeter retaining walls with level backfill, an equivalent fluid pressure of 36 pcf for the active condition and 55 pcf for the at-rest condition could be used for design. If low plasticity on-site soils are used as wall backfill then walls should be designed for an equivalent fluid pressure of 45 pcf for the active condition and 70 pcf for at-rest condition.

Design Earth Pressures under Earthquake Loading Conditions

Lateral earth pressures arising due to earthquake ground motions are dependent on numerous factors including the peak ground acceleration and ground motion characteristics. In addition to the static forces described above, the walls should be designed to sustain an incremental horizontal equivalent force, ΔP_{ae}, equal to:

$$\Delta P_{ae} = 15H^2$$

ΔP_{ae} is in pounds per linear foot of wall, where H is the wall height, in feet, and is based on a horizontal peak ground acceleration of 0.6g at the ground surface. The pressure distribution is triangular and the resultant should be assumed to act at one-third the height of the wall from the bottom. Dynamic earth pressure for the pump station walls is higher than the generator building walls due the presence of cohesive soils and the restrained condition at the top of the wall.

Resistance to Lateral Loads

Lateral resistance to sliding can be calculated as the sum of contributions developed by friction between the bottom of the footing and soil, and passive resistance on the front face of the footings or perimeter walls. For design purposes, we recommend a static coefficient of friction (ultimate) of 0.4 be used; the maximum resistance between concrete and the soil should not exceed 1,300 psf. Ultimate passive resistance of the soil should be estimated using an equivalent fluid weight of 400 pcf acting against the face of footing. The upper 1 foot of embedment should be neglected when calculating the passive resistance against spread footings. The recommended values for coefficient of friction and passive resistance should be used with an appropriate factor of safety.

Site Class

The site is located in Seismic Zone 4 and can be classified, from a seismic standpoint, as being a relatively stiff site. Soils at the site consist of fine and coarse-grained soils that become denser and stiffer with depth. In our opinion, based on available strength tests, the soil profile should be categorized as Site Class D as presented in Table 9.4.1.2 of ASCE 7.

Design Spectral Response Acceleration Parameters

Utilizing USGS Seismic Design Maps, Response Parameters and Design Parameters application, we estimate the following mapped spectral accelerations for the project site:

- Mapped spectral accelerations for short periods, $S_S = 1.5$
- Mapped spectral accelerations for 1-second period, $S_1 = 0.6$

Based on Table 1613.5.3 (1) and 1613.5.3 (2), the values of site coefficients F_a and F_v for a Site Class D are as follows:

- $F_a = 1.0$
- $F_v = 1.5$

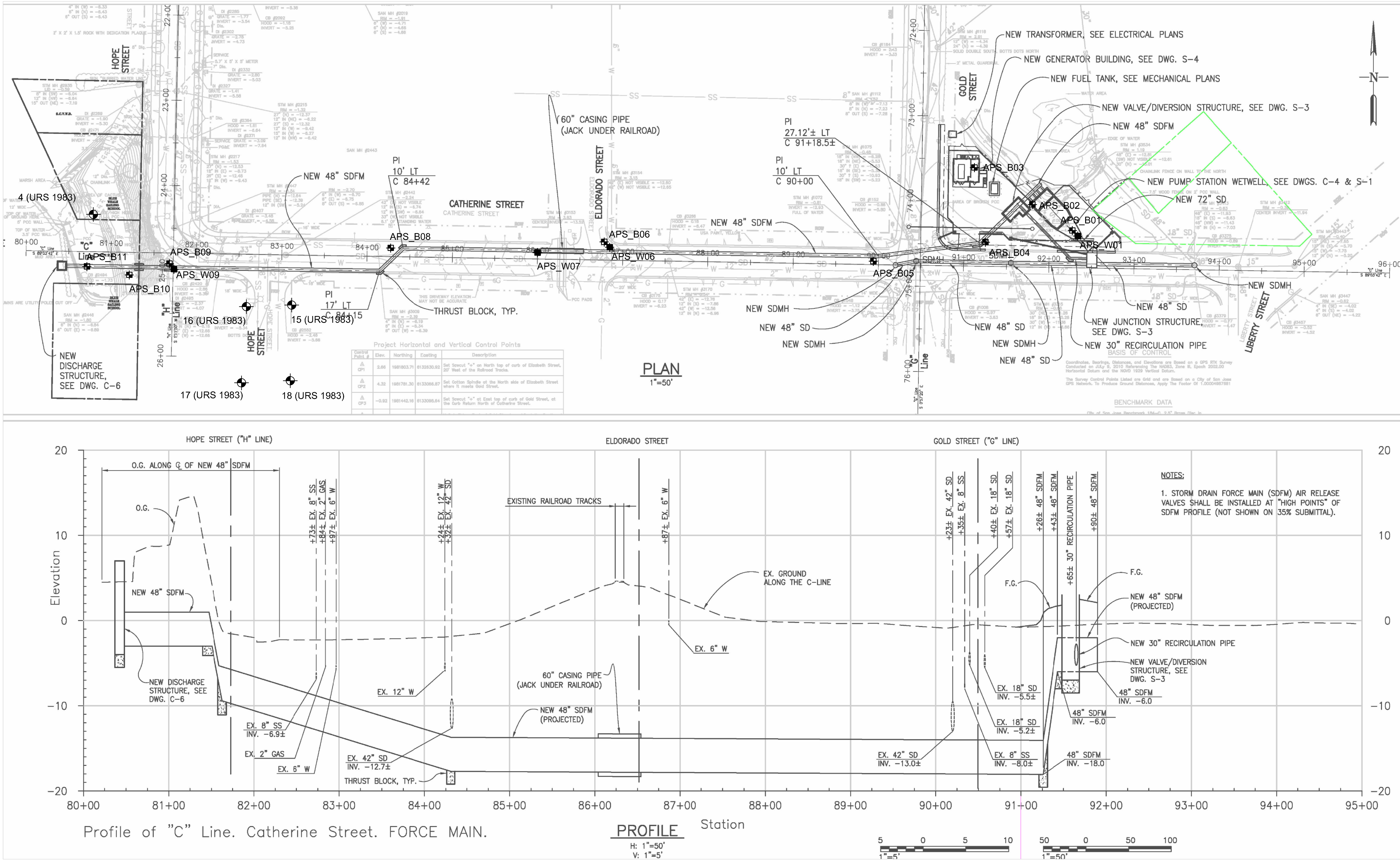
Limitations

This technical memorandum is intended to provide interim geotechnical design parameters to AN West, Inc. for the design of the generator building as part of the Alviso Pump Station project. The conclusions, recommendations and design criteria presented herein are based on the assumption that the subsurface soil and groundwater conditions do not deviate appreciably from those disclosed in the exploratory borings. Laboratory testing is under progress and these recommendations could be revised in the final Geotechnical Engineering Report.

The recommendations presented in this memorandum were developed with the standard of care commonly used as state of the practice in the profession. No other warranties are included, either express or implied, as to the professional advice provided.

Attachments

Figure 1	Site and Boring Location Plan
Figure 2	Log of Boring APS_B03



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APS_B08	Boring Location	15 (URS 1983)	Existing Boring Location from 1983 URS Study
APS_W01	Monitoring Well Location		

Project No. 28645607	Gold Street Pump Station	**Site and Boring Location Plan**	Figure 1
11/19/14	Alviso, California		
	URS		

Alviso Storm Pump Station; Alviso, California

BORING LOCATION:		GROUND SURFACE ELEVATION (ft): 1.7 TOP OF WELL CASING ELEVATION (ft): N/A	
DRILLING AGENCY	Exploration Geoservices, Inc — DRILLER Scott	DATE STARTED: 10/30/14 DATE FINISHED: 10/30/14	
DRILLING EQUIPMENT	Mobile B53	COMPLETION DEPTHS	BORING: 36.5 (ft) WELL: N/A (ft)
DRILLING METHOD	Hollow Stem Auger — DRILL BIT 8 inch	HAMMER/ DROP	140lb/30in
SIZE AND TYPE OF CASING	N/A	NUMBER OF SAMPLES	DIST: UNDIST:
TYPE OF PERFORATION	N/A — FROM N/A TO N/A	WATER DEPTH (ft)	FIRST: 13.5 ▽ COMPL.: 11 ▼ 24 hr.: N/A
SIZE AND TYPE OF PACK	N/A — FROM N/A TO N/A	LOGGED BY	M.Thummaluru — CHECKED BY

TYPE OF SEAL	TYPE	FR	TO	TYPE	FR	TO
	No. 1: Cement	0	36.5'	No. 3: N/A	N/A	N/A
	No. 2: N/A	N/A	N/A	No. 4: N/A	N/A	N/A

LOG OF BORING APS_B03
(Sheet 1 of 2)

ELEVATION (feet)	MATERIAL DESCRIPTION	ELEVATION (feet)	FIELD TESTS: POCKET PEN (tsf)	POCKET TV (psf)	STRAIN AT FAILURE,%	WATER LEVEL	DEPTH (feet)	SAMPLES: NUMBER / TYPE	RECOVERY (%)	BLOWS /foot	INDEX PROPERTIES: MOISTURE CONTENT (%)	DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	NOTES
	Silty GRAVEL (GM) FILL Dense, moist, light brown													
0	**Fat CLAY with Gravel (CH) FILL** Stiff, moist, dark gray	0												
								1	65	50/5"				
	Silty SAND with Gravel (SM) FILL Medium dense, moist, pieces of asphalt concrete							2	35	18				
	FILL						5				23	100		
	Fat CLAY (CH) Medium stiff to stiff, moist, dark gray with organics		1.0					3	45	8				
-5		-5												
	Lean CLAY (CL) Stiff, moist, light yellowish brown with gray mottling, trace fine gravel				15.0						21	106	4270	
			2.5					4	95	17				
							10							
						▼								
-10		-10												
						▽								
	Sandy Lean CLAY (CL) Medium stiff, moist to wet, light yellowish brown, trace fine gravel, occassional lenses of Silty SAND (SM)				15.0						22	107	2040	
								5	90	13				
							15							
-15		-15												
					15.0						23	103	2650	
								6	85	26				
	Silty SAND (SM)/Sandy SILT (ML) Medium dense, wet, light yellowish brown, low to non palstic						20							
-20		-20												
	Sandy, Silty CLAY (CL-ML) Medium stiff, wet, light brown with black mottles, low to medium plasticity				15.0						26	97	1090	
								7	95	33				

Alviso Storm Pump Station
Alviso, California

LOG OF BORING APS_B03
Continued- Sheet 2 of 2

DEPTH (feet)	MATERIAL DESCRIPTION	ELEVATION (feet)	FIELD TESTS: POCKET PEN (tsf)	POCKET TV (psf)	STRAIN AT FAILURE, %	WATER LEVEL	DEPTH (feet)	SAMPLES: NUMBER	TYPE	RECOVERY (%)	BLOWS /foot	INDEX PROPERTIES: MOISTURE CONTENT (%)	DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	NOTES
		25													
	Light yellowish brown		0.25		15.0			8		100	24	23	103	1230	
30							30								
		30													
								9		0	15				
35	**Silty SAND (SM)** Medium dense, wet, light grayish brown						35	10		100	19				
	BOTTOM OF BORING AT 36.5 FEET	35													
40		40					40								
45		45					45								
50		50					50								
55		55					55								

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100 W. San Fernando Street, Suite 200
San Jose, CA 95113
(408) 297-9585

Memorandum

Date: November 19, 2014

To: Michael McCullough
Public Works – Storm Section
City of San Jose

Cc: Andre G. Jadkowski, P.E
AN West, Inc.

From: Madhu Thummaluru, G.E.; Paul Boddie, G.E.

Subject: Pump Station/Wet Well Geotechnical Recommendations
Alviso Storm Pump Station Project
San Jose, CA

Project Description

The goal of the Alviso Storm Pump Station Project is to account for storm water runoff within the Alviso area and reduce flooding below the effects of a 100-year storm event. The existing pump station will be relocated to City owned property located on the northeast corner of Gold Street and Catherine Street, one block south of its current location. The site is now used as a parking lot, with grades ranging from about Elevation 0 to 2 feet. We understand the finish grade around the pump station will be raised to around Elevation 3 feet, paved with asphalt concrete and sloped to an internal storm drainage system connected to the pump station wet well.

As shown on the 35% drawings prepared by AN West, Inc., the site improvements will include five primary structures: pump station/wet well, valve/diversion structure, junction structure, generator building and outfall structure. The reinforced concrete well will be approximately 68 feet long and 10 feet at the entrance, widening to 28 feet wide at the back wall where the pumps will be located. The deepest part of the wet well floor will extend to Elevation -20 feet. The wet well floor slab will be approximately 2½ feet thick with the bottom of floor extending to about Elevation -22.5 feet.

Due to the wet well depth, shoring will be required during construction of the pump station. Shoring for the storm drain coming into the pump station also is anticipated. We understand that continuous interlocking steel sheet piling is being considered, both for temporary excavation support as well as to resist the buoyant uplift by pile adhesion.

Subsurface Field Exploration

A subsurface investigation was conducted at the site to help characterize the soil and groundwater conditions that will affect the design and construction of the planned improvements. Two (2) exploratory borings, APS_B01 and APS_B02, were drilled in the immediate vicinity of the pump station/wet well. Boring APS_B01 was drilled to a depth of 76½ feet below the existing ground surface (bgs), which is approximately 50 feet below the proposed bottom of the wet well. Boring APS_B02 was drilled to a depth of 35 feet bgs to obtain subsurface information near the diversion structure. Nine other borings (APS_B03 through APS_B11) were drilled to depths ranging from 30 to 36½ feet to obtain the subsurface information at the generator building, out fall structure and along the force main alignment. Well APS_W01 was drilled adjacent to APS_B01 down to about 34 feet for measurement of groundwater. Figure 1 presents the locations of the borings and wells with respect to the pump station layout and force main alignment. This technical memorandum is limited to the pump station/wet well.

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Subsurface Soil Conditions

Borings completed in the parking lot encountered pavement sections consisting of 1-inch asphalt concrete underlain by fill soils extending to depths of 2 to 6½ feet bgs. Fill soils generally consisted of poorly graded sand with silt, clayey sand with gravel, silty gravel and sandy lean clay. The native soils encountered generally consist of alternating layers of medium stiff to stiff fat clay and lean clay to depths of about 23½ to 25 feet, underlain by soft silty clay to depths of about 25 to 28 feet bgs. Below a depth of about 25 to 28 feet, is a layer of medium dense to dense poorly graded sand with silt that extends down to a depth of about 66 feet bgs. Very stiff silty clay was encountered between depths of 40 to 45 feet in Boring APS_B01. A layer of medium stiff lean clay and silty clay is encountered below the sand layer in Boring APS_B01 to terminal depth of 76½ feet. Comprehensive descriptions of the soils encountered in Borings APS_B01 and APS_B02 are presented on the log of boring presented as Figures 2 and 3, respectively. In addition, subsurface conditions encountered in the borings at pump station are graphically presented as fence diagram on Figure 4.

Groundwater Conditions

Because Borings APS_B01 and APS_B11 were advanced using the rotary-wash drilling method, it was not possible to measure the groundwater level at those exploration locations. However, groundwater was measured in the borings drilled with hollow-stem augers. After the completion of Boring APS_B02 on November 1, 2014, groundwater was recorded at a depth of 12 feet bgs (Elevation – 6 feet). Groundwater also was measured at a depth of about 7 to 8 feet (Elevation -6 to -7 feet) in monitoring well APS_W01 installed at the pump station on November 10, 2014.

Groundwater was measured at depths ranging from 3 to 20 feet bgs (Elevation -5 to -15 feet) in the other borings during and after completion of drilling. Subsequently, groundwater was measured at depths ranging from 4 to 9 feet (Elevation -6 to -7 feet) on November 1, 2014 and November 10, 2014 in the other monitoring wells installed for this project.

Seasonal fluctuations in the groundwater level are anticipated throughout the year. Additionally, we understand that 100-year flood level in the Alviso area is estimated to reach Elevation 7.3 feet ("Alviso Pump Station Alternative Schematic Design Report" by A-N West, Inc. and MTH Engineers, Inc., dated April 30, 2014).

Recommendations

Design Earth Pressures under Static Loading Conditions

Lateral earth pressures acting on vertical structural elements depend on a number of factors, including the structural element stiffness. When the walls are sufficiently stiff, as expected in the case of the wet well, it is assumed that they are restrained at the top and will not deflect; thus the soil behind the structure tends not to deform. As a result, the earth pressure corresponds to the "at-rest" condition. Based on the predominantly cohesive soil conditions encountered in the borings, the following lateral earth pressures (expressed in pounds per cubic foot) have been developed for design of vertical walls:

- At rest pressure
  70 pcf above high GWT
  100 f below high GWT

These recommended pressures are ultimate values and include the effect of time dependent creep in the cohesive soil that will be retained. The top half of Figure 5 schematically illustrates the expected lateral earth pressure distribution for static loading under at-rest conditions. The maximum loading shown is for the 100-year storm event with water at Elevation 7.3 feet.

We recognize that some structure layouts and other factors including reduced wall thickness may result in lower wall stiffnesses, such that the soil behind them might mobilize a limiting state corresponding to the active condition. If the walls are not restrained and are free to rotate at top, then walls can be designed to resist an equivalent fluid pressure for static loading, expressed in pounds per cubic foot (pcf) as follows:

- Active Pressure
  45 pcf above high groundwater table (GWT)
  90 pcf below high GWT

Surcharge loads such as vehicular traffic will apply additional loads to the walls. For design purposes, a surcharge pressure equivalent to 2 feet of soil should be applied to account for the traffic loads. Additional loads should be considered if specialized equipment such as cranes, AASHTO HS-20 truck loads or future structures will be located within an area described by an imaginary 45 degree plane extending up from the base of the structure to the ground surface.

Design Earth Pressures under Earthquake Loading Conditions

Lateral earth pressures arising due to earthquake ground motions are dependent on numerous factors including the peak ground acceleration and ground motion characteristics. In addition to the static forces described above, the walls should be designed to sustain an incremental horizontal equivalent force, ΔP_{ae}, equal to:

$$\Delta P_{ae} = 25H^2$$

ΔP_{ae} is in pounds per linear foot of wall, where H is the wall height, in feet, and is based on a horizontal peak ground acceleration of 0.6g at the ground surface. The pressure distribution is triangular and the resultant should be assumed to act at one-third the height of the wall from the bottom. The bottom half of Figure 5 schematically illustrates the expected lateral earth pressure distribution for seismic loading conditions.

Groundwater Level

As the likelihood of a 100-year flood occurring simultaneously with the maximum credible (design) earthquake is extremely low, we believe it is reasonable to assume a groundwater level for seismic loading lower than the maximum flood level. We recommend Elevation -5.0 feet be assumed for design.

Shoring Design

Considering the soil and groundwater conditions encountered at the pump station/wet well site, we believe the use of interlocking steel sheet piling is a prudent choice. Based on the conditions shown on the accompanying subsurface profile (Figure 4), we recommend the sheet piles be extended through the sand layer toe into the silty clay layer at about Elevation -40 feet.

The shoring system should be designed to be relatively rigid, with as many supports or struts as necessary to prevent straining and deformation of the supported soils. Preliminary lateral earth pressures have been developed for design of internally braced sheet piles, as illustrated on Figure 6. The Contractor's Registered Civil or Geotechnical Engineer should review the subsurface conditions and make an independent evaluation of the shoring earth pressure. However, in no event should the earth pressures P_a and P_w be less than the values shown in Figure 6.

Passive pressure will develop against the sheet piles below a depth Z under the base of the excavation as shown on Figure 6. Preliminary values of ultimate passive resistance (assuming the soil is clay) should be estimated using an equivalent pressure distribution, P_p in psf of:

$$P_p = 60xz + 1{,}000$$

If the soil is sand, an equivalent fluid weight of 180 pcf is recommended. A minimum factor of safety of 1.5 is recommended for use in estimating passive resistance. Passive resistance should be ignored in the top 1½ feet penetration below the bottom of the excavation. It should be the responsibility of the Contractor to determine the actual embedment depth and submit his design to URS and AN West, Inc. for review before installation. In order to minimize post-construction settlement of the pump station, we recommend that the sheet piling be permanently left in place. To resist the buoyant effects, an adhesion value of 750 psf (ultimate) can be assumed at the soil-sheet piling vertical interface.

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Limitations

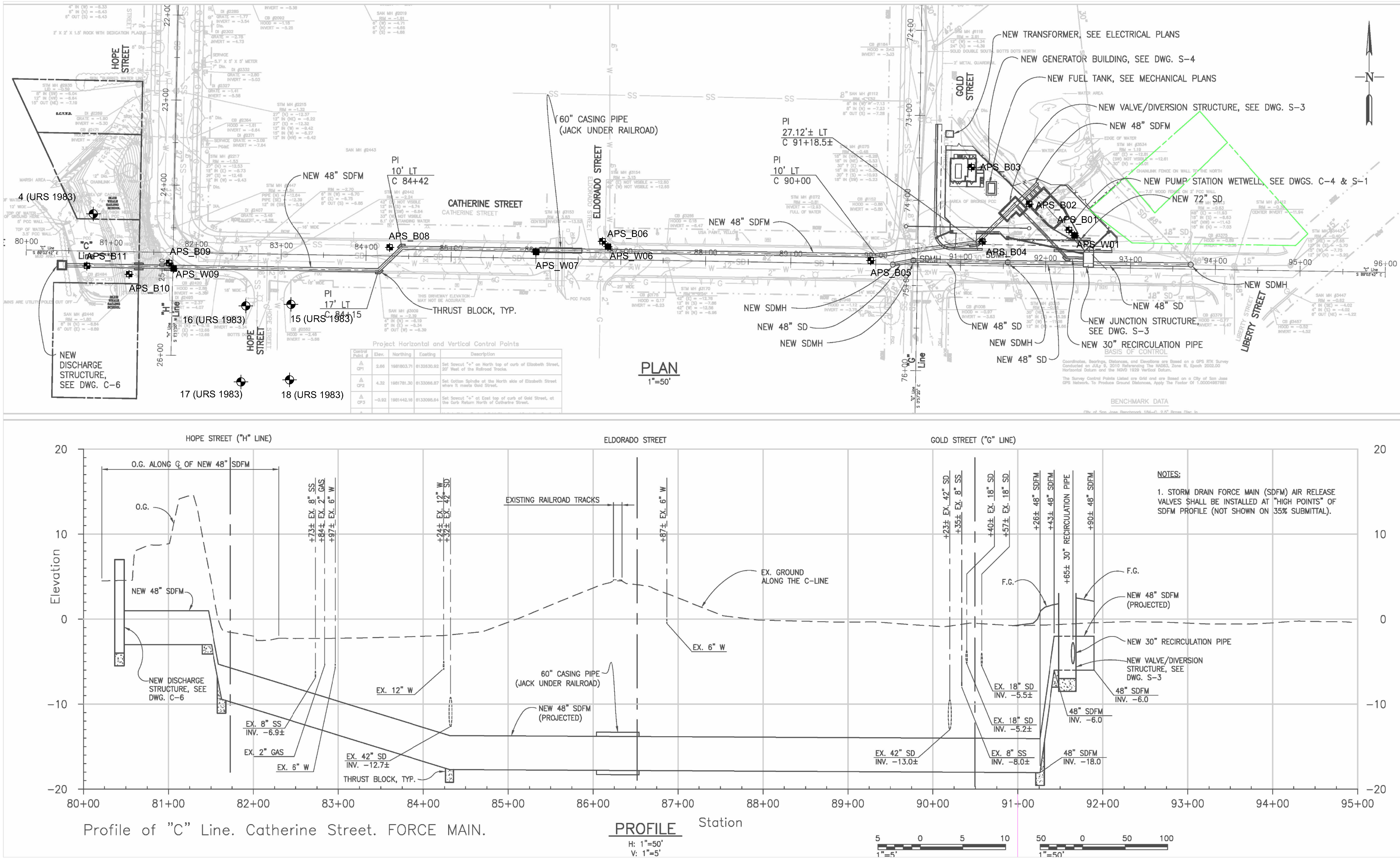
This technical memorandum is intended to provide interim geotechnical design parameters to AN West, Inc. for the design of the pump station as part of the Alviso Pump Station project. The conclusions, recommendations and design criteria presented herein are based on the assumption that the subsurface soil and groundwater conditions do not deviate appreciably from those disclosed in the exploratory borings. Laboratory testing is under progress and these recommendations could be revised in the final Geotechnical Engineering Report.

The design of construction shoring and dewatering systems are the responsibility of the Contractor. The preliminary geotechnical shoring recommendations in this memo are for use by AN West, Inc. only in construction planning and preliminary cost estimating. The Contractor should retain a Registered Civil or Geotechnical Engineer and an experienced dewatering Subcontractor to develop the construction shoring and dewatering systems.

The recommendations presented in this memorandum were developed with the standard of care commonly used as state of the practice in the profession. No other warranties are included, either express or implied, as to the professional advice provided.

Attachments

Figure 1	Site and Boring Location Plan
Figure 2	Log of Boring APS_B01
Figure 3	Log of Boring APS_B02
Figure 4	Idealized Subsurface Profile
Figure 5	Lateral Earth Pressure Considerations for Permanent Pump Station Walls
Figure 6	Lateral Earth Pressure Diagram for Shoring System



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APS_B08 Boring Location

APS_W01 Monitoring Well Location

15 (URS 1983) Existing Boring Location from 1983 URS Study

Project No. 28645607	Gold Street Pump Station	Site and Boring Location Plan	Figure 1
11/19/14	Alviso, California		
	URS		

Alviso Storm Pump Station; Alviso, California

BORING LOCATION: Pump Station			GROUND SURFACE ELEVATION (ft): 1.3 TOP OF WELL CASING ELEVATION (ft): N/A
DRILLING AGENCY	Exploration Geoservices, Inc	DRILLER Loren	DATE STARTED: 10/29/14 DATE FINISHED: 10/29/14
DRILLING EQUIPMENT	Mobile B53		COMPLETION DEPTHS BORING: 76.5 (ft) WELL: N/A (ft)
DRILLING METHOD	Rotary Wash	DRILL BIT 6 inch	HAMMER/DROP 140lb/30in
SIZE AND TYPE OF CASING	N/A		NUMBER OF SAMPLES DIST: UNDIST:
TYPE OF PERFORATION	N/A	FROM N/A TO N/A	WATER DEPTH (ft) FIRST: N/A COMPL.: N/A 24 hr.: N/A
SIZE AND TYPE OF PACK	N/A	FROM N/A TO N/A	LOGGED BY M.Thummaluru CHECKED BY

TYPE OF SEAL	TYPE	FR	TO	TYPE	FR	TO
	No. 1: Cement	0	76.5'	No. 3: N/A	N/A	N/A
	No. 2: N/A	N/A	N/A	No. 4: N/A	N/A	N/A

LOG OF BORING APS_B01

(Sheet 1 of 3)

ELEVATION (feet)	MATERIAL DESCRIPTION	POCKET PEN (tsf)	POCKET TV (psf)	STRAIN AT FAILURE,%	WATER LEVEL	DEPTH (feet)	NUMBER	TYPE	RECOVERY (%)	BLOWS /foot	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	NOTES
	1-inch Asphalt Concrete (AC)													
0	**Poorly Graded SAND with Silt (SP-SM) FILL** Medium dense, moist, light yellowish brown FILL													
		1.5					1		90	19				
	Clayey SAND with Gravel (SC) FILL Medium dense, moist, reddish brown													
	Fat CLAY (CH) Stiff, moist, dark gray Trace gravel			14.0							24	95	2460	
		1.25					2		75	11				
						5								
							3		75	7				
-5														
	No gravel													
	Medium stiff					10								
		0.75					4		35	20				
-10														
				15.0		15					20	103	3140	
		1.0					5		65	15				
-15														
	Lean CLAY (CL) Very stiff, moist, light brown with organe and black mottling			14.0		20					21	108	7320	
		3.0					6		90	31				
-20														

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PROJECT NO. 28645607

Figure: 2

Alviso Storm Pump Station
Alviso, California

LOG OF BORING APS_B01

Continued- Sheet 2 of 3

DEPTH (feet)	MATERIAL DESCRIPTION	ELEVATION (feet)	POCKET PEN (tsf)	POCKET TV (psf)	STRAIN AT FAILURE, %	WATER LEVEL	NUMBER	RECOVERY (%)	BLOWS /foot	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	NOTES
	Sandy, Silty CLAY (CL-ML)> Very soft, wet, light yellowish brown, low to non-plastic	-25			10.0		7	90	9	27	92	440	
	Poorly Graded SAND with Silt (SP-SM) Dense, wet, grayish brown												
30		-30					8	95	34	21	105		
							9	90	50				
35	Coarse sand with fine gravel	-35					10	95	41	15	118		
40	**Silty CLAY (CL-ML)** Very stiff, wet, light grayish brown with orange mottling	-40	2.25				11	90	19				
45	**Poorly Graded SAND with Silt (SP-SM)** Dense, wet, light brownish gray	-45					12	90	64	19	107		
50	Medium dense	-50											
55		-55					13	90	20	16	112		

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Alviso Storm Pump Station
Alviso, California

LOG OF BORING APS_B01

Continued- Sheet 3 of 3

DEPTH (feet)	SOIL GRAPHIC	MATERIAL DESCRIPTION	ELEVATION (feet)	FIELD TESTS: POCKET PEN (tsf)	FIELD TESTS: POCKET TV (psf)	FIELD TESTS: STRAIN AT FAILURE, %	FIELD TESTS: WATER LEVEL	DEPTH (feet)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY (%)	SAMPLES: BLOWS /foot	INDEX PROPERTIES: MOISTURE CONTENT (%)	INDEX PROPERTIES: DRY DENSITY (pcf)	INDEX PROPERTIES: UNCONFINED COMPRESSIVE STRENGTH (psf)	NOTES
60			-60					60								
65				1.75				65	14		75	38				
		Lean CLAY (CL) Medium stiff, moist, light yellowish brown	-65													
70			-70					70								
75		**Silty CLAY (CL-ML)** Very soft, wet, low to non-plastic						75	15			29				
		BOTTOM OF BORING AT 76.5 FEET	-75													
80			-80					80								
85			-85					85								
90								90								

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PROJECT NO. 28645607

Figure: 2

Alviso Storm Pump Station; Alviso, California

BORING LOCATION:			GROUND SURFACE ELEVATION (ft): 2 TOP OF WELL CASING ELEVATION (ft): N/A
DRILLING AGENCY	Exploration Geoservices, Inc	DRILLER Scott	DATE STARTED: 10/30/14 DATE FINISHED: 10/30/14
DRILLING EQUIPMENT	Mobile B53		COMPLETION DEPTHS BORING: 35.0 (ft) WELL: N/A (ft)
DRILLING METHOD	Hollow Stem Auger	DRILL BIT 8 inch	HAMMER/ DROP 140lb/30in
SIZE AND TYPE OF CASING	N/A		NUMBER OF SAMPLES DIST: UNDIST:
TYPE OF PERFORATION	N/A	FROM N/A TO N/A	WATER DEPTH (ft) FIRST: N/A COMPL.: 12 24 hr.: N/A
SIZE AND TYPE OF PACK	N/A	FROM N/A TO N/A	LOGGED BY M.Thummaluru CHECKED BY

TYPE OF SEAL	TYPE	FR	TO	TYPE	FR	TO
	No. 1: Cement	0	35'	No. 3: N/A	N/A	N/A
	No. 2: N/A	N/A	N/A	No. 4: N/A	N/A	N/A

LOG OF BORING APS_B02

(Sheet 1 of 2)

MATERIAL DESCRIPTION

1 inch Asphalt Concrete (AC)

Sandy Lean CLAY (CL) FILL
Stiff, moist, light brown

Clayey SAND with Gravel (SC) FILL
Loose, wet, light yellowish brown, small pieces of a brick

FILL

Fat CLAY (CH)
Medium stiff to stiff, moist, dark gray

Lean CLAY (CL)
Stiff, moist, light yellowish brown

Sandy, Silty CLAY (CL-ML)
Medium stiff, wet, light grayish brown with orange mottling

Lean CLAY (CL)
Stiff, moist, light grayish brown with orange mottling
Reddish brown with orange mottling

Sandy, Silty CLAY (CL-ML)
Soft, wet, low to non plastic

FIELD TESTS / SAMPLES / INDEX PROPERTIES

NUMBER	POCKET PEN (tsf)	POCKET TV (psf)	STRAIN AT FAILURE,%	RECOVERY (%)	BLOWS /foot	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	NOTES
1				0	10				
2				0	12				
3	1.0			70	7				
4	1.0			25	11	31	87		
5				50					Shebly pushed with 15 psi pressure for the first 6 inches and then with 70 psi.
6	1.5		13.0	90	17	25	104	2890	
7	1.75		9.0	100	22	21	107	3240	
8			12.0	95	13	26	96	790	

Elevation (feet): 0, -5, -10, -15, -20
Depth (feet): 5, 10, 15, 20

Alviso Storm Pump Station
Alviso, California

LOG OF BORING APS_B02
Continued- Sheet 2 of 2

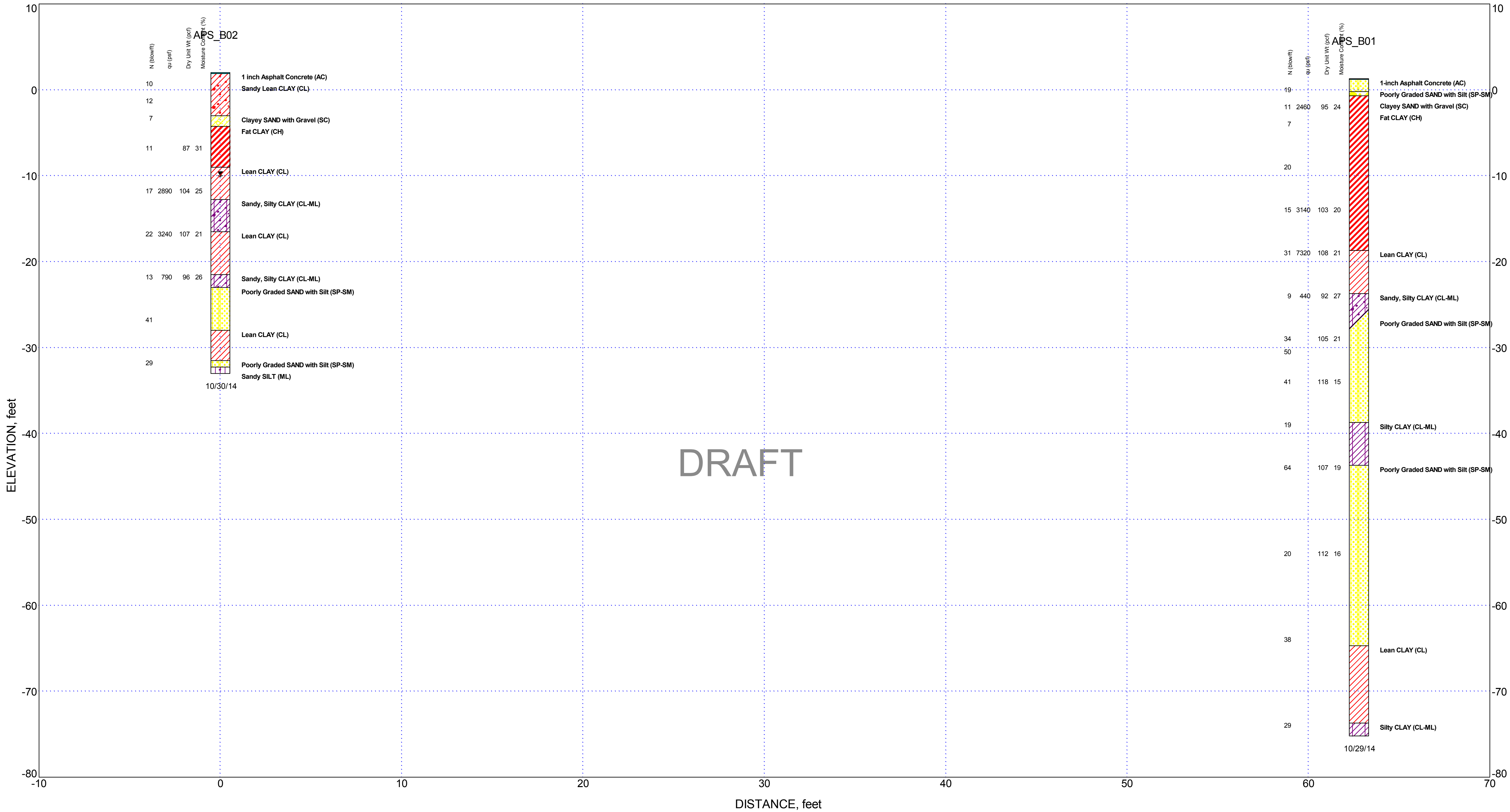
DEPTH (feet)	SOIL GRAPHIC	MATERIAL DESCRIPTION	ELEVATION (feet)	FIELD TESTS: POCKET PEN (tsf)	POCKET TV (psf)	STRAIN AT FAILURE, %	WATER LEVEL	DEPTH (feet)	SAMPLES: NUMBER	TYPE	RECOVERY (%)	BLOWS /foot	INDEX PROPERTIES: MOISTURE CONTENT (%)	DRY DENSITY (pcf)	UNCONFINED COMPRESSIVE STRENGTH (psf)	NOTES
		Poorly Graded SAND with Silt (SP-SM) Dense, grayish brown, wet	-25													
									9		100	41				
30		**Lean CLAY (CL)** Medium stiff, wet, light yellowish brown	-30					30								
		Poorly Graded SAND with Silt (SP-SM) Medium dense, wet, grayish brown							10		100	29				
		Sandy SILT (ML)/Silty SAND (SM) Medium dense, wet, light yellowish brown														
35		**BOTTOM OF BORING AT 35 FEET**	-35					35								
40			-40					40								
45			-45					45								
50			-50					50								
55			-55					55								

DRAFT

URS

PROJECT NO. 28645607

Figure: 3



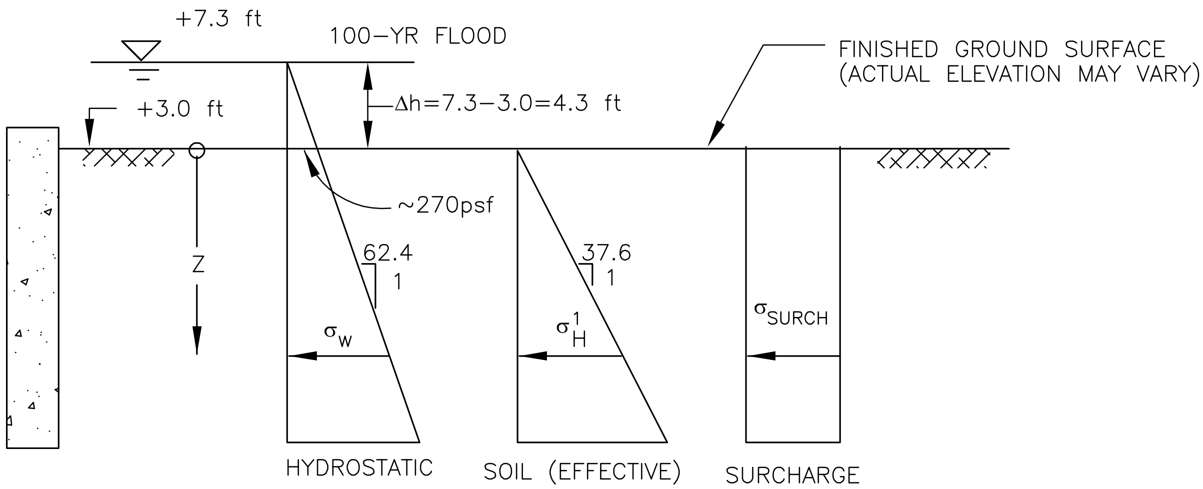
Project: Alviso Storm Pump Station
Project Number: 28645607

Idealized Subsurface Profile

Figure
4

11/19/14 2CON_EL_20130603_CPTSOUNDINGONLY 28645607-ALVISO PUMP STATION.GPJ

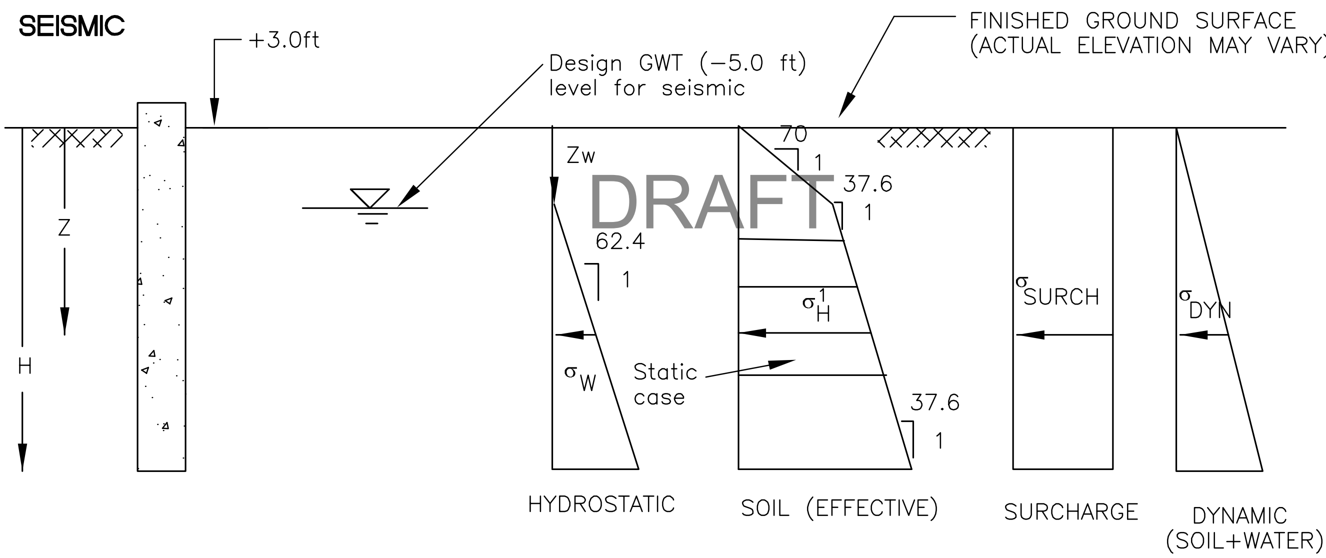
STATIC



- $\sigma_w = 62.4 \times [z+\Delta h] = 270 + 62.4 \times z$ (psf)
- $\sigma^1_H = (125-62.4) \times 0.6 \times z = 37.6 \times z$ (psf)
- $\sigma_{SURCH} = 0.6 \times 240 = 145$ psf
- EXAMPLE IS FOR AT REST PRESSURE CONDITION

Not to Scale

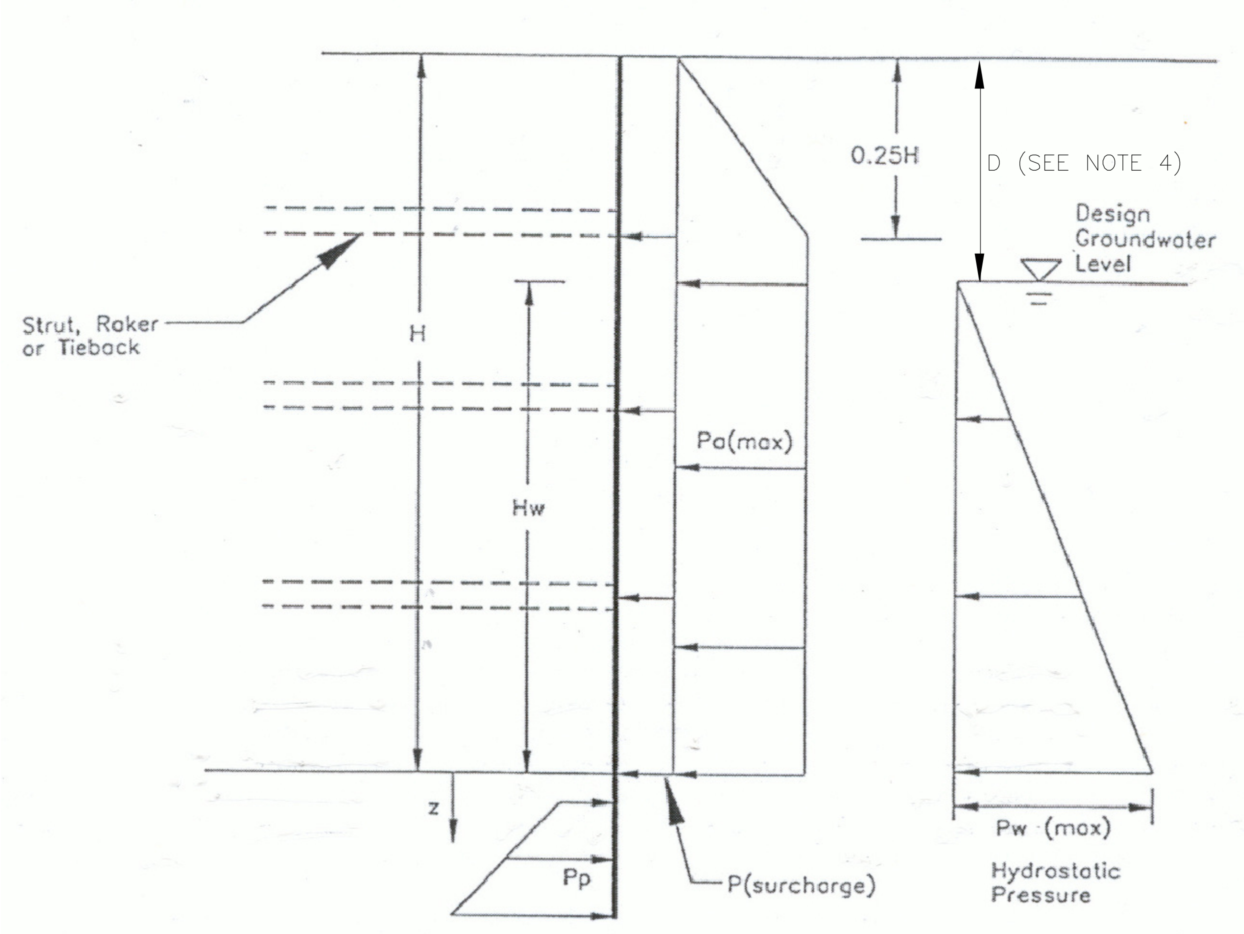
SEISMIC



- σ_{SURCH} :SAME AS ABOVE FOR STATIC
- $\sigma_w = 0$ FOR $Z \leqslant Zw$, $\sigma_w = 62.4 \times (Z-Zw)$ for $Z>Zw$
- $\sigma^1_H = 70xZ$ FOR $Z \leqslant Zw$
  $\sigma^1_H = 70xZw + 37.6x(Z-Zw)$ FOR $Z > Zw$
- $\sigma_{DYN} = \Delta Paex2/HxH$
- $\Delta Pae = 25xHxH$ (Resultant Seismic)
- Zw IS AVERAGE, ASSUME AT ELEVATION −5.0ft
- EXAMPLE IS FOR AT REST PRESSURE
- 100 Year Flood Elevation obtained from "Alviso Pump Station Alternative Schematic Design Report" by A–N West, Inc and MTH Engineers, Inc, dated April 30, 2014.

Not to Scale

Project No. 28645607	Alviso Storm Pump Station San Jose, California	LATERAL EARTH PRESSURE CONSIDERATIONS FOR PERMANENT PUMP STATION WALLS	Figure 5
11/11/14			
URS			



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LEGEND:

H = Height of wall (feet)

Pa(max) = Maximum apparent earth pressure
= (25 x H) psf

P(surcharge) = 120 psf

Pw(max) = Hydrostatic Pressure
= (62.4 x Hw) psf

Pp = Ultimate passive pressure along embedded section
= (220 x z) psf; assumes saturated sand below base of excavation.

= (60 x z + 1,000) psf; assumes saturated clay below base of excavation.

1. Horizontal surcharge pressure based on a uniform adjacent vertical surcharge of 240 psf. This surcharge pressure may be insufficient and should be increased if large equipment or stockpiled soil will be immediately adjacent to the shoring.
2. A minimum factor of safety of 1.5 should be used in passive pressure calculations.
3. Neglect upper passive resistance 1.5 feet below excavation bottom.
4. D should be calculated based on the existing ground surface elevation. Design Groundwater Elevation is −5.0 ft.
5. Diagrams are applicable to interlocking steel sheetpile system and/or soldier beam and lagging system.
6. Passive pressure on embedded section to be selected by Contractor's Geotechnical Engineer

Project No. 28645607	ALVISO STORM PUMP STATION San Jose, California	LATERAL EARTH PRESSURE DIAGRAM FOR SHORING SYSTEM	Figure 6
11/11/14			
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